Abstract Submitted
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Nanoscale Radiative Heat Transfer between a Scanning Probe and a Flat Surface[1] BAI SONG, KYEONGTAE KIM, WOOCHUL LEE, WON HO JEONG, EDGAR MEYHOFER, PRAMOD REDDY, University of Michigan, Ann Arbor — Fluctuational electrodynamics based calculations predict a significant increase in the efficiency of thermophotovoltaic devices when an emitter is placed in the close proximity of an appropriately designed photovoltaic (PV) cell. The enhancement is expected to be further increased if the emissive properties of the emitter are matched to the band gap of the PV cell via nanostructuring. However, before this can be accomplished, it is necessary to better understand the underlying physics. This is especially true given the discrepancies seen between published experimental and theoretical studies. Here we present our measurements of nanoscale radiative heat transfer between the tip of scanning probes and an atomically flat surface spatially separated by very small gaps (1-10 nm). The experiments were performed in a UHV environment using custom-developed scanning probed with picowatt heat-flow resolution. Current measurements show significant deviations from computational predictions. We are currently studying radiative thermal transport between a range of materials to reveal the contribution of important effects such as non-locality and eddy currents.

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